

ART. XXIV.—*New or Little-known Victorian Fossils in the National Museum.*

PART XVII.—SOME TERTIARY CEPHALOPODA.

BY FREDERICK CHAPMAN, A.L.S., &c.

(Palaeontologist to the National Museum, Melbourne).

[With Plates III.–VIII.]

[Read December 10th, 1914].

Introductory Note.

The series herein discussed comprises examples of cephalopod shells, some of which have been in the collection for many years. In the case of the genus *Nautilus* the fossils are generally fragile, or are only known as casts, so that it is often impossible to get quite perfect representatives which would serve as complete types. These specimens, imperfect as they are, nevertheless afford many characters of differentiation which will serve to distinguish the several forms; and, indeed, the only named Australian Tertiary species of the genus *Nautilus* (*N. geelongensis*), was originally described from an imperfect cast by Mr. A. H. Foord in his British Museum Catalogue of Cephalopoda. It seems, therefore, in the interests of systematic work upon Victorian Tertiary fossils to place on record, without further delay, some of the chief of our cephalopod fossils of this latest geological era.

The present collection comprises the following forms:—

Aturia australis, McCoy.

Nautilus balcombensis, sp. nov.

„ *geelongensis*, Foord.

„ *altifrons*, sp. nov.

„ *felix*, sp. nov.

Notosepia clifftoni, gen. et sp. nov.

DESCRIPTION OF THE FOSSILS.

TETRABRANCHIATA.—Order NAUTILOIDEA.

Fam. CLAUDONAUTILIDÆ, Hyatt.

Genus *Aturia*, Bronn.

Aturia australis, McCoy. (Plate III., Fig. 2).

Nautilus zizac, T. Woods, 1862, Geol. Observ. in S. Australia, p. 83, woodcut.

Aturia australis, McCoy, 1867, On the Recent Zoology and Palaeontology of Victoria, Ann. Mag. Nat. Hist., ser. 3, Vol. XX., p. 192. Brough Smyth, 1874, in Geol. Surv. Vic.; Report of Progress, p. 36.

Aturia zizac, Sow. sp., var. *australis*, McCoy, 1876, Prod. Pal. Vict., dec. III., p. 21, pl. XXIV., figs. 1-5.

Aturia zizac, Sow. sp. Etheridge junr., 1878, Cat. Austr. Fossils, p. 171.

Aturia aturi, Basterot sp., var. *australis*, McCoy, Foord, 1891, Cat. Fossil Cephalopoda (Brit. Mus.), pt. II., p. 354; also p. 336, fig. 71b.

Aturia australis, McCoy, Dennant and Kitson, 1903, Cat. Fossils Cain. Fauna Victoria, Rec. Geol. Surv. Vict., Vol. I., pt. 2, p. 92.

Observations.—The Australian form of the type of *Aturia aturi*, Basterot, has been the subject of wavering opinion amongst palaeontologists as to its specific or varietal standing. The present study of a large number of Australian specimens seems to show that it is a distinct form, having some marked characters which help to distinguish it from the Burdigalian species of France and Italy.

McCoy in 1876 (vide supra p. 21), remarked that "It is with the compressed Miocene variety found at Dax, named *N. Aturi* by Basterot, rather than with the more ventricose original types of the *N. zizac* of Sowerby, proper to the Eocene London clay, that our Australian fossil more completely agrees; and I can only doubtfully suggest the separation of it as a local variety, from the somewhat greater compression indicated by the slightly greater length of the aperture in proportion to its width; and also a slightly greater curvature of the septa on the sides as shown by a line from the apex of the lancet-shaped lobe to the inner end of the same septum, encroaching rather more on the third chamber behind."

Mr. A. H. Foord in his British Museum Catalogue has taken the same standpoint as McCoy, and regarded it as a variety, the specific

type being *Aturia aturi*. Foord says (op. cit. p. 355), "This variety closely resembles the Dax specimens of *Aturia aturi*; a specimen from "Muddy Creek," Victoria (Australia) being quite indistinguishable at first sight from the Dax fossils. On comparing, however, a specimen of the latter with the Muddy Creek shell, both being of equal size, it is found that the Australian shell has a larger siphuncular orifice than the Dax specimens, thus adding another point of difference to those indicated by McCoy as existing between the two forms."

Quite recently M. Vignal, of Paris, has favoured the Museum with a specimen of *Aturia aturi*, of Burdigalian age, from Dax, Landes, France. On comparing this specimen with Australian examples, the following features, already pointed out by McCoy and Foord are seen:—

- (1) The Australian shells are more compressed.
- (2) The septa and growth-lines are more strongly recurved towards the periphery.
- (3) The siphuncular orifice is larger.

In view of the above-named characters, which are constant so far as my own observations go, there are justifiable grounds for keeping the Australian form as a distinct species, at the same time bearing in mind that its relationship is nearest *Aturia aturi*. It is only fair to state, however, that Mr. R. B. Newton, during his visit with the British Association to Melbourne this year, informed us at the sessional meeting that he and Mr. G. C. Crick, of the British Museum of Natural History, are agreed to consider our Australian species as identical with *Aturia aturi*. Probably did the London Museum possess a larger comparative series of the Australian form, that view might undergo some modification, and it is to be regretted that Mr. Newton did not have time to critically examine the series of *Aturiae* in the Melbourne National Museum.

C. F. Parona in 1899 described from Gassino, Piedmont, an Upper Eocene or Oligocene *Aturia* under the name of *A. rovasendiana*.¹ This species has a compressed shell after the mode of *A. aturi*, but in the structure of the septation it shows more affinity with *A. ziczac* and its allies. This species thus appears to indicate a connecting link between the palaeogene and neogene aturids.

Occurrence and Horizons.—The related European *Aturia aturi* is, so far as I can discover, typically found in Miocene beds in

1 Pal. Ital., vol. iv. (1898), 1899, p. 156, pl. xii., fig. 1; pl. xiii., figs. 1-3.

2 Foord. Brit. Mus. Cat., supra cit., p. 354 ("London Clay.")

France, Malta and Italy, although recorded, apparently in error, from the Lower Eocene, since no Eocene locality is given in the list that follows. The Australian species on the other hand, has a very extensive range, from Oligocene to Lower Pliocene, and throughout seems to maintain its specific characters.

Oligocene or Balcombian.—Muddy Creek, near Hamilton (lower beds), Newport and Altona bores, Port Phillip. Balcombe Bay and Grice's Creek, Port Phillip.

Miocene or Janjukian.—Gellibrand River (low down in series). Brown's Creek, Otway Coast. Birregurra. Lower Moorabool, Mitchell River, Gippsland. Mount Gambier, South Australia. Table Cape, Tasmania. Spring Creek, near Torquay. Flemington, near Melbourne.

Lower Pliocene or Kalimnan.—Beaumaris.

FAM. NAUTILIDAE, Owen.

Genus *Nautilus*, Linné.

Nautilus balcombensis, sp. nov. (Plate III., Figs. 3, 4; Plate IV. Figs. 5, 6; Plate VIII., Figs. 18, 19).

Description.—Shell well inflated, periphery well rounded. Dorsal arch not so deep as in *N. geelongensis*. Septa, about 17 in the last whorl; sutures slightly waved. Umbilicus narrow and deep. Siphuncle a little above the centre in a young specimen. Young examples show a striated surface of shell, as in adult forms from mesozoic strata.

Dimensions.—Type specimen (from Balcombe Bay): greatest diameter, 205 mm.; height of aperture, 118 mm.; width, 110 mm. Another specimen (from Muddy Creek): greatest diameter, 80 mm.; height of aperture, 45.5 mm.; width, 42 mm. A small specimen (from Balcombe Bay): Height of aperture, 23 mm.; width, 26 mm.

Affinities.—This *Nautilus* attains to a large size, but is very difficult to secure in anything like a complete state owing to the thinness of the shell, and its frequent occurrence in loose, shelly marl. The type of shell is near *N. regalis*, Sowerby,¹ but, unlike that species, has an open, though narrow umbilicus. At first sight it might be confused with *N. geelongensis*, as a compressed variety, but the latter species has fewer chambers, a more strongly arched dorsum, and a siphuncle situated slightly below the centre. The

¹ Mineral Conchology, 1882, vol. iv., p. 77, pl. 355.

sides of *N. geelongensis* are also more strongly convex, and proportionately broader, whilst the body chamber in *N. balcombensis* is higher and more nearly equal to the width, which it exceeds in the later stages.

Occurrence and Horizon.—The type specimen is from Balcombe Bay; collected and presented by Mr. F. A. Cudmore. This particular specimen must have lain for some time on the Balcombian sea-bed, since there are numerous attached valves of *Dimya dissimilis*, Tate, adherent to the exterior of the shell.

Other specimens, presented by Mr. Cudmore, from the same locality, are in the brepic and neanic stages. Another example, in the Museum collection, in the ephebic stage, was collected by the writer from Muddy Creek (lower beds). All the examples are from strata of Balcombian age.

Nautilus geelongensis, Foord. (Plate IV., Figs. 7-9).

Nautilus geelongensis, Foord, 1891, Cat. Foss. Cephalopoda (Brit. Mus.), part II., p. 332, woodcut fig. 69.

Description.—The following diagnosis is quoted from A. H. Foord:—

“Sp. Char. A number of detached casts of the chambers which, when fitted together, make up a shell of a somewhat inflated form, rather compressed on the sides, and broadly rounded on the periphery. The aperture would be considerably wider than high. The septa are moderately distant, the sutures very slightly flexuous, with a dorsal lobe in the young shell. . . . The siphuncle is nearly central, perhaps a little below the centre. Not a vestige of the shell remains.”

The above description, based on a cast, gives the chief points about the form of this species. Judging by the figure given by Foord, the type specimen would possess about 15 chambers on the last whorl, and this number coincides with the examples I have identified as *N. geelongensis* in the Museum collection. It occurs throughout the Miocene proper, or the Janjukian series of Victoria, but chiefly in the form of a cast of the interior of the shell. The shell is occasionally met with, but the beds in which it is found are not usually favourable for the extraction of the fossil in anything like completeness. Only one such shell is preserved in the Museum collection. The shell is moderately thin, and the outer layer conspicuously marked with growth lines. The umbilicus is apparently nearly closed; the sutures slightly flexuous.

Casts of the interior of the shell of this species, from the Murray River cliffs, show that the annular lobe on the dorsum or impressed zone is very distinct in the earlier camerae, but become fainter, and disappear on reaching the ephelic stage of the shell. It is interesting to note in connection with the presence of the annular lobe in this species, that it is also seen in another Australian form, *N. felix*, but less strongly developed.

Dimensions.—The type specimen of *N. geelongensis*, figured by Foord (op. cit. p. 333, fig. 69), has a maximum diameter of about 114 mm. The height of aperture is about 45 mm., and the width 63 mm.

A shell from Fyansford shows, height of aperture from impressed zone to periphery, 25 mm.; width, 32 mm.

Another specimen (cast), from the Murray River, measures on the aperture about 67 mm. in height, and 89 mm. in width.

Observations.—This species is apparently the commonest and best known of the Victorian Tertiary nautili, since it is a typical form in the widely developed Janjukian series, although ranging into the Kalimnan. Occurring so often in polyzoal rock, however, it is met with generally in the form of an internal cast of the shell. This is obviously due to the great solvent processes continually proceeding in and through this porous limestone. The characters and form of the original shell are so often clearly shown in the casts, as to leave no room for doubting the identity of the species. The general form of *N. geelongensis* is like that of *N. imperialis*, Sowerby,¹ but is not so wide at the aperture.

Occurrence and Horizon.—The original locality, "near Geelong," is somewhat vague, as it may have come from any of the chalky or polyzoal limestones within a wide radius in that district. All of those localities, however, would belong to the Janjukian series. Casts of *Nautilus*, probably of this species, occur in South Australia, in the white and yellow limestone of the Murray cliffs. A cast of *N. geelongensis* preserved in the white polyzoal limestone of that locality was presented by the late Rev. C. S. Y. Price, to whom the Museum has been indebted from time to time for many valuable specimens.

The small example, having the shell preserved, was collected by Mr. J. F. Mulder, at Fyansford, the deposit at which locality I now include in the Janjukian series.

1 Min. Conch., vol. i., 1812, p. 2, pl. i.

From the Kalimnan series (Lower Pliocene) at its base, a fine example of *N. geelongensis* has been collected by Mr. Kurtze, of Hochkirch, which specimen was subsequently presented to the Museum by Mr. C. French, junr. It occurred in a gypsum-bearing bed, opposite Mr. Henty's farm, on the Grange Burn, associated with *Ostrea manubriata* and *Natica cunninghamensis*, and is itself partially filled with selenite.

Nautilus altifrons, sp. nov. (Plate V., Figs. 10-12; Plate VI., Fig 13).

Description.—This species is of moderate to large size. It is remarkable for the compressed form of the shell, and its consequently high apertural front. The chambers number about 15 to 17 in the last whorl. The umbilicus is open and deep, but not of great width; it has the appearance of being stepped, owing to the compression of the sides of each turn of the shell. The sutures are more undulate than in *N. geelongensis*, from which it is further distinguished by its depressed form, and almost quadrate aperture. Siphuncle sometimes preserved by the infilling of the shell with selenite, when it is seen to be ventral in position.

Dimensions.—Greatest diameter of type specimen, about 225 mm.; width of umbilicus, 13 mm.; height of aperture, 124 mm.; width, 103 mm.

Affinities.—This form of *Nautilus* is of the *N. urbanus* type, of the London Clay, near London, and the I. of Sheppey. In *N. urbanus* the siphuncle is described by Edwards¹ as dorsal in position, whilst in the present species, *N. altifrons*, as seen in the remarkably fine selenite casts, it is decidedly ventral.

Occurrence and Horizon.—*N. altifrons* appears to be restricted to Janjukian strata. It occurs at the Murray River cliffs (type), where it is found preserved in gypsum of the clear variety selenite, which mineral has invaded the chambers, whilst the shelly septa and siphuncle are often well preserved. A cast of this species in white polyzoal limestone from Nor'-west Bend, Murray River, South Australia, is also found in the Museum collection. A cast of *Nautilus*, probably referable to this species, occurring at Bairnsdale, was presented by Mr. W. A. C. a'Beckett.

¹ "Mon. Eocene Cephalopoda and Univalves of England," vol. i. (Pal. Soc.), 1849, p. 46.

Nautilus felix,¹ sp. nov. (Plate VI., Fig. 14; Plate VII., Fig. 15).

Description.—Shell somewhat compressed, or only moderately inflated, with a well rounded periphery; whorls increasing rapidly. Camerae high, and with the sutures slightly undulate; few in number, nine in the last whorl. A feeble annular lobe on the impressed zone. Umbilicus rather wide and deep. Aperture roundly dome-shaped; higher than wide.

Dimensions.—Maximum diameter of shell in type specimen, 85 mm.; minimum diameter, 63 mm.; height of aperture, 47 mm.; width, 42 mm.; width of umbilicus, 7.5 mm.

Observations.—This form differs in many respects from any other known Victorian species. Its salient characters are—its compressed form compared with *N. balcombensis* and *N. geelongensis*, the wide umbilicus, and the small number of camerae in each whorl.

Occurrence and Horizon.—Happy Valley, South Australia (*Magellania pectoralis* beds)² Janjukian (Miocene). Type specimen in the Dennant coll.

DIBRANCHIATA.

Fam. SEPIOPHORIDÆ.

Genus *Notosepia*, gen. nov.

Notosepia cliftonensis, sp. nov. (Plate VII., Figs. 16, 17; Plate VIII., Figs. 20-22).

Description.—Shell or sepion large and comparatively thick, but variable in the latter respect, according to habitat; triangular ovate in ventral aspect. Alveolus moderately deep, filling up with age. Ventral lip of alveolar border recurved, and sometimes quite pendent; inner surface of lip radiately grooved or fluted. Back and sides of sepion coarsely reticulated or labyrinthic, and spongy. Vestigial septation of the internal surface of the pro-ostracum faintly marked, but stronger than in the living *Sepia*. Pro-ostracum strongly convex dorsally, at the anterior end becoming depressed and marked with strongly-arched lamellar growth-lines. Mucro thick, cylindrical, and bluntly terminated; in fully grown specimens directly in line with the back of the pro-ostracum, but in younger specimens having a slight tendency to recurve.

¹ Name suggested by its occurrence at Happy Valley.

² For notes on this deposit see H. Basedow, Trans. R. Soc. S.A., vol. xxviii., 1904, p. 248.

Dimensions.—Approximate length of type specimen (including impression of the anterior part of the pro-ostracum), 132 mm.; width of anterior extremity of pro-ostracum, 63 mm.; thickness of ventral lip of alveolus in type specimen, 8 mm.; approximate length of mucro, measured dorsally from the basal sinus at junction with the pro-ostracum, 13.5 mm. Distance from centre of alveolus to edge of lip, 21.5 mm.

Relationships.—Presumably on account of the thickened ventral lip of the alveolar border, and the strong mucro, the present species has been listed by some Australian authors in the genus *Belosepia*. Although characters such as those mentioned, agree with *Belosepia*, yet the latter genus is distinct in several essential characters, and these may be tabulated as follows:—

	<i>Belosepia</i> (Middle Eocene).	<i>Notosepia</i> (Oligocene).	<i>Sepia</i> (Living).
Dorsum	- Strongly convex anteriorly; vellicate posteriorly.	- Strongly convex.	- Flatly convex.
Alveolar cavity	- Deep and conical; inner surface with distant septation.	- Moderately deep; inner surface with faint septation.	- Shallow; inner surface with faint transverse lamellae.
Alveolar lip	- Greatly extended, flabelliform.	- Moderately thick, overhanging.	- A sharp projecting border.
Mucro	- Large, thick and bent backward.	- Moderately large, thick, bent backward in young form, afterwards straight.	- Small, generally slender, and either straight, or bent backward or forward.

It is especially noteworthy that young individuals of *Notosepia*, in having a recurved mucro, point to the older *Belosepia* type of shell; whilst the straight mucro of the adult form agrees more nearly with that of the living *Sepia*, in which it is normally straight, or only slightly bent.

Observations.—A large portion of the inner surface of the anterior region of the pro-ostracum in the type specimen, was fortunately preserved in collecting the specimen, and this materially adds to our knowledge of the form of the complete sepion. The pro-ostracum is thin and expanded, as in *Sepia*, and bordered by a wrinkled sub-chitinous membrane.

Practically all the specimens of *N. cliftoni* in the collection had lain on the sea-bed for some considerable time before being covered up, for the interior of the pro-ostracum generally carries attached organisms, as polyzoa and *Dimya* (right or attached valves).

Occurrence and Horizon.—The type specimen was presented to the Museum by Mr. F. P. Spry, and was collected by Mr. H. Lodge at Clifton Bank, Muddy Creek, from the upper, brown polyzoal marls of Balcombian age. It also occurs in the lower, blue marls of the same series. There is a specimen in the Dennant coll., from the same locality, and several examples in the Museum coll., found by the late Mr. W. Kershaw, at Balcombe Bay and Grice's Creek, Port Phillip. These latter examples are of slightly thinner build, indicative in all probability of their deeper water habitat, as compared with the deposits at Muddy Creek.

EXPLANATION OF PLATES.

PLATE III.

- Fig. 1.—*Aturia aturi*, Basterot. Broken shell, showing the character and arrangement of the siphuncular funnels. Of Burdigalian age. Dax. Nat. size.
- Fig. 2.—*Aturia australis*, McCoy. Broken shell, showing the internal structure. Balcombian. Grice's Creek, Port Phillip. (Coll. J. F. Bailey). Nat. size.
- Fig. 3.—*Nautilus balcombensis*, sp. nov. Exterior of shell of type specimen, lateral aspect; with attached valves of *Dimya dissimilis*. Balcombian. Balcombe Bay, Port Phillip. (Coll. F. A. Cudmore). 7-17 nat. size.
- Fig. 4.—*N. balcombensis*, sp. nov. Opposite face of the same shell, showing the internal concameration. About $\frac{2}{3}$ nat. size.

PLATE IV.

- Fig. 5.—*N. balcombensis*, sp. nov. Apertural aspect of the same shell. Slightly less than half nat. size.
- Fig. 6.—*N. balcombensis*, sp. nov. Apertural aspect of an example in the neanic stage. Balcombian. Balcombe Bay, Port Phillip. (Coll. F. A. Cudmore). Paratype. Nat. size.

- Fig. 7.—*Nautilus geelongensis*, Foord. A cast in polyzoal rock. Janjukian. Murray Cliffs, South Australia. (Coll. Rev. C. S. Y. Price). 3-5th nat. size.
- Fig. 8.—*N. geelongensis*, Foord. Shell infilled with gypsum. Kalimnan. Cliffs opposite Henty's farmstead, Grange Burn, near Hamilton, Victoria. Lateral aspect. Nat. size.
- Fig. 9.—*N. geelongensis*, Foord. Apertural view of the above specimen. Nat. size.

PLATE V.

- Fig. 10.—*Nautilus altifrons*, sp. nov. Type specimen. Lateral aspect. Janjukian. Murray River Cliffs, South Australia. About 4-10th nat. size.
- Fig. 11.—*N. altifrons*, sp. nov. Apertural aspect of the above. About 4-10th nat. size.
- Fig. 12.—*N. altifrons*, sp. nov. Portion of a shell infilled with selenite; showing the septa and siphuncle preserved in situ. Janjukian. Murray River Cliffs, South Australia. Nat. size.

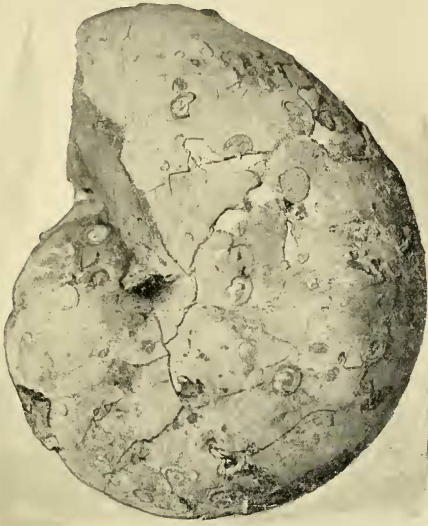
PLATE VI.

- Fig. 13.—*Nautilus altifrons*, sp. nov. A cast in polyzoal limestone. Janjukian. Nor'-west Bend, Murray River, South Australia. Paratype. About 3-5th nat. size.
- Fig. 14.—*Nautilus felix*, sp. nov. Lateral aspect of type specimen. A siliceous internal cast; with portion of the shell preserved. Janjukian. Happy Valley, South Australia. (Dennant coll.). About nat. size.

PLATE VII.

- Fig. 15.—*N. felix*, sp. nov. Apertural aspect of the above specimen. About nat. size.
- Fig. 16.—*Notosepia cliftonensis*, sp. et gen. nov. Internal face of sepion of type specimen. Balcombian. Clifton Bank, Muddy Creek, near Hamilton, Victoria. (Coll. H. Lodge). Nat. size.
- Fig. 17.—*N. cliftonensis*, sp. nov. Side view of above specimen. Nat. size.

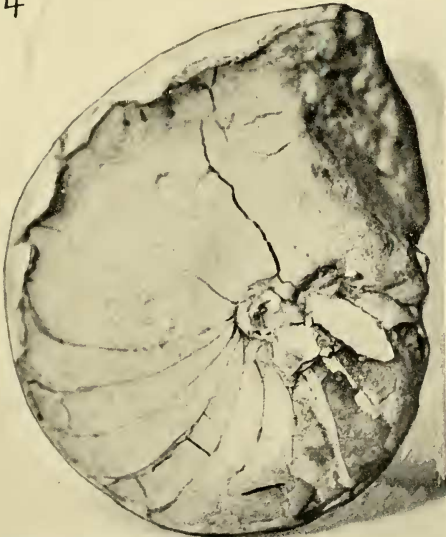
3



1



4



2

